

1 CLAIMS

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3 1. A processor-readable medium comprising processor-executable
4 instructions configured for:

5 receiving an instruction specifying additional per-frame DV metadata to
6 extract from a DV data stream; and

7 extracting the metadata from a DV frame of the DV data stream in response
8 to the instruction.

9
10 2. A processor-readable medium as recited in claim 1, comprising
11 further processor-executable instructions configured for:

12 storing the metadata in a container; and

13 attaching the container to a video sample of the DV frame.

14
15 3. A processor-readable medium as recited in claim 1, wherein the
16 receiving an instruction comprises:

17 receiving an AddPack call to add a DVPackID to an extraction list;

18 receiving a RemovePack call to remove a DVPackID from the extraction
19 list; and

20 receiving a RemoveAllPacks call to remove all DVPackIDs from the
21 extraction list.

22
23 4. A processor-readable medium as recited in claim 3, comprising
24 further processor-executable instructions configured for:

1 returning a number indicating an amount of DVPackIDs present in the
2 extraction list in response to a GetCount call; and

3 returning a DVPackID at an index in the extraction list in response to a
4 GetPackID call that specifies the index.

5
6 5. A processor-readable medium as recited in claim 1, wherein the
7 extracting comprises:

8 determining a DVPackID from an extraction list; and

9 identifying the metadata within the DV frame based on the DVPackID.

10
11 6. A processor-readable medium as recited in claim 2, comprising
12 further processor-executable instructions configured for managing the container.

13
14 7. A processor-readable medium as recited in claim 6, wherein the
15 managing the container comprises:

16 adding a DV_METADATA structure to the container in response to an Add
17 call;

18 removing a DV_METADATA structure from the container in response to a
19 Remove call;

20 removing all items from the container in response to a RemoveAll call;

21 returning a number indicating an amount of items present in the container in
22 response to a GetCount call;

23 locking the container for exclusive access in response to a Lock call;

24 unlocking the container in response to an Unlock call;

1 retrieving an item from the container at a beginning index of the container
2 in response to a GetFirst call; and

3 retrieving an item from the container at a next index of the container in
4 response to a GetNext call.

5
6 8. A processor-readable medium as recited in claim 7, wherein the
7 DV_METADATA structure comprises an unpacked version of a DV metadata
8 pack.

9
10 9. A processor-readable medium as recited in claim 8, wherein the
11 DV_METADATA structure comprises:

12 binary values unpacked from the DV metadata pack; and
13 a different variable name associated with each binary value.

14
15 10. A processor-readable medium as recited in claim 2, comprising
16 further processor-executable instructions configured for:

17 demultiplexing the DV frame to generate the video sample and an audio
18 sample.

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20 11. A computer comprising the processor-readable medium as recited in
21 claim 1.

22
23 12. A processor-readable medium comprising processor-executable
24 instructions configured for:

25 managing a DV metadata extraction list; and

1 extracting a DV metadata pack from a DV frame based on a DVPackID
2 within the extraction list.

3

4 13. A processor-readable medium as recited in claim 12, comprising
5 further processor-executable instructions configured for storing the DV metadata
6 pack into an IMFDMetadataContainer.

7

8 14. A processor-readable medium as recited in claim 13, comprising
9 further processor-executable instructions configured for attaching the
10 IMFDMetadataContainer to a DV sample of the DV frame.

11

12 15. A processor-readable medium as recited in claim 13, comprising
13 further processor-executable instructions configured for unpacking the DV
14 metadata pack into a DV pack-specific data structure.

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16 16. A processor-readable medium as recited in claim 15, comprising
17 further processor-executable instructions configured for storing the DV pack-
18 specific data structure into the IMFDMetadataContainer.

19

20 17. A processor-readable medium as recited in claim 15, wherein the DV
21 pack-specific data structure comprises:

22 binary values unpacked from the DV metadata pack; and
23 a different variable name associated with each binary value.

1 **18.** A processor-readable medium as recited in claim 12, wherein the
2 managing comprises:

3 adding a DVPackID to the extraction list in response to an AddPack call;
4 removing a DVPackID from the extraction list in response to a
5 RemovePack call;

6 removing all DVPackIDs from the extraction list in response to a
7 RemoveAllPacks call;

8 returning a number indicating an amount of DVPackIDs present in the
9 extraction list in response to a GetCount call; and

10 returning a DVPackID at an index in the extraction list in response to a
11 GetPackID call that specifies the index.

12
13 **19.** A processor-readable medium as recited in claim 12, wherein the
14 extracting comprises:

15 identifying the DV metadata pack in the DV frame through a header in the
16 DV metadata pack that contains the DVPackID; and

17 pulling the DV metadata pack out of the DV frame.

18
19 **20.** A processor-readable medium as recited in claim 13, comprising
20 further processor-executable instructions configured for managing the
21 IMFDMetadataContainer.

22
23 **21.** A processor-readable medium as recited in claim 20, wherein the
24 managing the IMFDMetadataContainer comprises:

1 adding a DV_METADATA structure to the IMFDDVMetadataContainer in
2 response to an Add call;

3 removing a DV_METADATA structure from the
4 IMFDDVMetadataContainer in response to a Remove call;

5 removing all items from the IMFDDVMetadataContainer in response to a
6 RemoveAll call;

7 returning a number indicating an amount of items present in the
8 IMFDDVMetadataContainer in response to a GetCount call;

9 locking the IMFDDVMetadataContainer for exclusive access in response to a
10 Lock call;

11 unlocking the IMFDDVMetadataContainer in response to an Unlock call;

12 retrieving an item from the IMFDDVMetadataContainer at a beginning index
13 of the IMFDDVMetadataContainer in response to a GetFirst call; and

14 retrieving an item from the IMFDDVMetadataContainer at a next index of
15 the IMFDDVMetadataContainer in response to a GetNext call.

16
17 22. A computer comprising the processor-readable medium as recited in
18 claim 12.

19
20 23. A method comprising:

21 receiving an instruction to extract DV metadata from a DV data stream;
22 extracting the metadata from the DV data stream in response to the
23 instruction;

24 storing the metadata in a container; and

25 attaching the container to a video sample of the DV data stream..

1
2 **24.** A method as recited in claim 23, further comprising managing access
3 to the container according to method calls on a container API (application
4 programming interface).

5
6 **25.** A method comprising:
7 managing DVPackIDs in a DV metadata extraction list based on method
8 calls to a metadata extraction API (application programming interface); and
9 extracting a DV metadata pack from a DV frame based on a DVPackID
10 within the extraction list.

11
12 **26.** A method as recited in claim 25, further comprising:
13 unpacking the DV metadata pack into a DV pack-specific data structure;
14 and
15 storing the DV metadata pack and the DV pack-specific data structure in a
16 container.

17
18 **27.** A method as recited in claim 26, further comprising attaching the
19 container to a video sample of the DV frame.

20
21 **28.** A method as recited in claim 27, further comprising managing access
22 to the container based on method calls to a container API.

23
24 **29.** A computer comprising a DV metadata extraction tool configured to
25 extract metadata from a DV frame and enable access to the metadata.

1
2 **30.** A computer as recited in claim 29, wherein the DV metadata
3 extraction tool comprises:

4 an extraction interface configured to maintain an extraction list of
5 DVPackIDs in response to method calls from an application and to store DV packs
6 in a container based on the extraction list of DVPackIDs; and

7 a container interface configured to store a DV pack-specific data structures
8 in the container and to manage access to DV packs and DV pack-specific data
9 structures in response to method calls from the application.

10
11 **31.** A computer as recited in claim 29, further comprising a multimedia
12 architecture that includes the DV metadata extraction tool.

13
14 **32.** A computer comprising:
15 means for managing a DV metadata extraction list; and
16 means for extracting a DV metadata pack from a DV frame based on a
17 DVPackID within the extraction list.

18
19 **33.** A computer as recited in claim 32, further comprising means for
20 storing the DV metadata pack into an IMFIDVMetadataContainer.

21
22 **34.** A computer as recited in claim 33, further comprising means for
23 attaching the IMFIDVMetadataContainer to a DV sample of the DV frame.

24
25 **35.** A computer as recited in claim 33, further comprising:

1 means for unpacking the DV metadata pack into a DV pack-specific data
2 structure; and

3 means for storing the DV pack-specific data structure into the
4 IMFDDVMetadataContainer.

5
6 36. A processor-readable medium having stored thereon a data structure
7 representing a 5-byte DV_METADATA_CONTROL_CASSETTE_ID pack, the
8 data structure comprising:

9 a MicError field having data unpacked from a second byte of the pack;
10 a MultiBytes field having data unpacked from the second byte of the pack;
11 a MemoryType field having data unpacked from a second byte of the pack;
12 a MemorySizeOfSpace0 field having data unpacked from a third byte of the
13 pack;

14 a MemorySizeOfLastBlankInSpace1 field having data unpacked from the
15 third byte of the pack;

16 a MemoryBankNumberOfSpace1 field having data unpacked from a fourth
17 byte of the pack; and

18 a TapeThickness field having data unpacked from a fifth byte of the pack.

19
20 37. A processor-readable medium having stored thereon a data structure
21 representing a 5-byte DV_METADATA_CONTROL_TAPE_LENGTH pack, the
22 data structure comprising:

23 a TapeLength field having data unpacked from bytes 2 through 4 of the
24 pack.

1 **38.** A processor-readable medium having stored thereon a data structure
2 representing a 5-byte DV_METADATA_TEXT_HEADER pack, the data
3 structure comprising:

4 a TotalTextData field having data unpacked from a second and third byte of
5 the pack;

6 a TextType field having data unpacked from the third byte of the pack;

7 an OptionNumber field having data unpacked from the third byte of the
8 pack;

9 a TextCode field having data unpacked from a fourth byte of the pack;

10 an AreaNumber field having data unpacked from a fifth byte of the pack;

11 and

12 a TopicTag field having data unpacked from the fifth byte of the pack.

13

14 **39.** A processor-readable medium having stored thereon a data structure
15 representing a 5-byte DV_METADATA_TAG pack, the data structure comprising:

16 an AbsoluteTrackNumber field having data unpacked from a second, third,
17 and fourth byte of the pack;

18 a BlankFlag field having data unpacked from the second byte of the pack;

19 a TextFlag field having data unpacked from a fifth byte of the pack;

20 a TemporaryTrue field having data unpacked from the fifth byte of the
21 pack;

22 a HoldFlag field having data unpacked from the fifth byte of the pack; and

23 a TagID field having data unpacked from the fifth byte of the pack.

1 **40.** A processor-readable medium having stored thereon a data structure
2 representing a 5-byte DV_METADATA_TITLE_TIME_CODE pack, the data
3 structure comprising:

4 a Blank Flag field having data unpacked from a second byte of the pack;

5 a Tens of Frames field having data unpacked from the second byte of the
6 pack;

7 a Units of Frames field having data unpacked from the second byte of the
8 pack;

9 a Tens of Seconds field having data unpacked from a third byte of the pack;

10 a Units of Seconds field having data unpacked from the third byte of the
11 pack;

12 a Tens of Minutes field having data unpacked from a fourth byte of the
13 pack;

14 a Units of Minutes field having data unpacked from the fourth byte of the
15 pack;

16 a Tens of Hours field having data unpacked from a fifth byte of the pack;

17 and

18 a Units of Hours field having data unpacked from the fifth byte of the pack.

19
20 **41.** A processor-readable medium having stored thereon a data structure
21 representing a 5-byte pack, the data structure comprising:

22 a BinaryGroup2 field having data unpacked from a second byte of the pack;

23 a BinaryGroup1 field having data unpacked from the second byte of the
24 pack;

25 a BinaryGroup4 field having data unpacked from a third byte of the pack;

1 a BinaryGroup3 field having data unpacked from the third byte of the pack;
2 a BinaryGroup6 field having data unpacked from a fourth byte of the pack;
3 a BinaryGroup5 field having data unpacked from the fourth byte of the
4 pack;
5 a BinaryGroup8 field having data unpacked from a fifth byte of the pack;
6 and
7 a BinaryGroup7 field having data unpacked from the fifth byte of the pack.

8

9 **42.** A processor-readable medium having stored thereon a data structure
10 representing a 5-byte DV_METADATA_PROGRAM_REC_DTIME pack, the
11 data structure comprising:

12 a RecordingMode field having data unpacked from a second byte of the
13 pack;
14 a Minutes field having data unpacked from the second byte of the pack;
15 a Week field having data unpacked from a third byte of the pack;
16 an Hours field having data unpacked from the third byte of the pack;
17 a Year field having data unpacked from a fourth and fifth byte of the pack;
18 a Day field having data unpacked from the fourth byte of the pack; and
19 a Month field having data unpacked from the fifth byte of the pack.

20

21 **43.** A processor-readable medium having stored thereon a data structure
22 representing a 5-byte DV_METADATA_AAUX_SOURCE pack, the data
23 structure comprising:

24 a LockedFlag field having data unpacked from a second byte of the pack;

1 an AudioFrameSize field having data unpacked from the second byte of the
2 pack;
3 a StereoMode field having data unpacked from a third byte of the pack;
4 a Channel field having data unpacked from the third byte of the pack;
5 a PairBit field having data unpacked from the third byte of the pack;
6 an AudioMode field having data unpacked from the third byte of the pack;
7 a MultiLanguage field having data unpacked from a fourth byte of the pack;
8 a FiftySixty field having data unpacked from the fourth byte of the pack;
9 a SystemType field having data unpacked from the fourth byte of the pack;
10 an Emphasis field having data unpacked from a fifth byte of the pack;
11 a TimeConstant field having data unpacked from the fifth byte of the pack;
12 a SamplingFrequency field having data unpacked from the fifth byte of the
13 pack; and
14 a Quantization field having data unpacked from the fifth byte of the pack.

15
16 **44.** A processor-readable medium having stored thereon a data structure
17 representing a 5-byte DV_METADATA_AAUX_SOURCE_CONTROL pack, the
18 data structure comprising:

19 a CopyGenerationManagementSystem field having data unpacked from a
20 second byte of the pack;
21 an InputSource field having data unpacked from the second byte of the
22 pack;
23 a Compression field having data unpacked from the second byte of the
24 pack;

1 a SourceSituation field having data unpacked from the second byte of the
2 pack;
3 a RecordingStart field having data unpacked from a third byte of the pack;
4 a RecordingEnd field having data unpacked from the third byte of the pack;
5 a RecordMode field having data unpacked from the third byte of the pack;
6 an InsertChannel field having data unpacked from the third byte of the
7 pack;
8 a DirectionFlag field having data unpacked from a fourth byte of the pack;
9 a PlaybackSpeed field having data unpacked from the fourth byte of the
10 pack; and
11 a GenreCategory field having data unpacked from a fifth byte of the pack.

12
13 **45.** A processor-readable medium having stored thereon a data structure
14 representing a 5-byte pack, the data structure comprising:

15 a DaylightSavingsTime field having data unpacked from a second byte of
16 the pack;
17 a ThirtyMinutesFlag field having data unpacked from the second byte of the
18 pack;
19 a Tens of Time Zone field having data unpacked from the second byte of
20 the pack;
21 a Units of Time Zone field having data unpacked from the second byte of
22 the pack;
23 a Tens of Day field having data unpacked from a third byte of the pack;
24 a Units of Day field having data unpacked from the third byte of the pack;
25 a Week field having data unpacked from a fourth byte of the pack;

1 a Tens of Month field having data unpacked from the fourth byte of the
2 pack;
3 a Units of Month field having data unpacked from the fourth byte of the
4 pack;
5 a Tens of Year field having data unpacked from a fifth byte of the pack; and
6 a Units of Year field having data unpacked from the fifth byte of the pack.

7

8 **46.** A processor-readable medium having stored thereon a data structure
9 representing a 5-byte pack, the data structure comprising:

10 a Tens of Frames field having data unpacked from a second byte of the
11 pack;
12 a Units of Frames field having data unpacked from the second byte of the
13 pack;
14 a Tens of Seconds field having data unpacked from a third byte of the pack;
15 a Units of Seconds field having data unpacked from the third byte of the
16 pack;
17 a Tens of Minutes field having data unpacked from a fourth byte of the
18 pack;
19 a Units of Minutes field having data unpacked from the fourth byte of the
20 pack;
21 a Tens of Hours field having data unpacked from a fifth byte of the pack;
22 and
23 a Units of Hours field having data unpacked from the fifth byte of the pack.

1 **47.** A processor-readable medium having stored thereon a data structure
2 representing a 5-byte DV_METADATA_AAUX_CLOSED_CAPTION pack, the
3 data structure comprising:

4 a MainAudioLanguage field having data unpacked from a second byte of
5 the pack;

6 a MainAudioType field having data unpacked from the second byte of the
7 pack;

8 a SecondAudioLanguage field having data unpacked from a third byte of
9 the pack; and

10 a SecondAudioType field having data unpacked from the third byte of the
11 pack.

12
13 **48.** A processor-readable medium having stored thereon a data structure
14 representing a 5-byte pack, the data structure comprising:

15 a Data field having data unpacked from a second byte through a fifth byte
16 of the pack; and

17 a DataType field having data unpacked from the second byte of the pack.

18
19 **49.** A processor-readable medium having stored thereon a data structure
20 representing a 5-byte DV_METADATA_VAUX_SOURCE pack, the data
21 structure comprising:

22 a Tens of TV Channel field having data unpacked from a second byte of the
23 pack;

24 a Units of TV Channel field having data unpacked from the second byte of
25 the pack;

1 a B/W field having data unpacked from a third byte of the pack;
2 an Enable Color field having data unpacked from the third byte of the pack;
3 a Color Frames Identification field having data unpacked from the third
4 byte of the pack;
5 a Hundreds of TV Channel field having data unpacked from the third byte
6 of the pack;
7 a Source Code field having data unpacked from a fourth byte of the pack;
8 a 50/60 field having data unpacked from the fourth byte of the pack;
9 a Signal Type field having data unpacked from the fourth byte of the pack;
10 and
11 a Tuner Category field having data unpacked from a fifth byte of the pack.

12

13 **50.** A processor-readable medium having stored thereon a data structure
14 representing a 5-byte DV_METADATA_VAUX_SOURCE_CONTROL pack, the
15 data structure comprising:

16 a CopyGenerationManagementSystem field having data unpacked from a
17 second byte of the pack;
18 a JustPreviousInput field having data unpacked from the second byte of the
19 pack;
20 a Compression field having data unpacked from the second byte of the
21 pack;
22 a SourceSituation field having data unpacked from the second byte of the
23 pack;
24 a RecordStart field having data unpacked from a third byte of the pack;
25 a RecordMode field having data unpacked from the third byte of the pack;

1 a DisplaySelect field having data unpacked from the third byte of the pack;
2 a FrameField field having data unpacked from a fourth byte of the pack;
3 a FirstSecond field having data unpacked from the fourth byte of the pack;
4 a FrameChange field having data unpacked from the fourth byte of the
5 pack;

6 an Interlace field having data unpacked from the fourth byte of the pack;
7 a StillField field having data unpacked from the fourth byte of the pack;
8 a StillCamera field having data unpacked from the fourth byte of the pack;
9 a BroadcastSystem field having data unpacked from the fourth byte of the
10 pack; and

11 a GenreCategory field having data unpacked from a fifth byte of the pack.

12
13 **51.** A processor-readable medium having stored thereon a data structure
14 representing a 5-byte DV_METADATA_VAUX_CLOSED_CAPTION pack, the
15 data structure comprising:

16 a FirstFieldFirstByte field having data unpacked from a second byte of the
17 pack;

18 a FirstFieldSecondByte field having data unpacked from a third byte of the
19 pack;

20 a SecondFieldFirstByte field having data unpacked from a fourth byte of the
21 pack; and

22 a SecondeFieldSecondByte field having data unpacked from a fifth byte of
23 the pack.

1 **52.** A processor-readable medium having stored thereon a data structure
2 representing a 5-byte DV_METADATA_CAMERA_CONSUMER_CAMERA_1
3 pack, the data structure comprising:

4 an Iris field having data unpacked from a second byte of the pack;
5 an AEMode field having data unpacked from a third byte of the pack;
6 an AGC field having data unpacked from the third byte of the pack;
7 a WBMode field having data unpacked from a fourth byte of the pack;
8 a WhiteBalance field having data unpacked from the fourth byte of the
9 pack;
10 a FocusMode field having data unpacked from a fifth byte of the pack; and
11 a FocusPosition field having data unpacked from the fifth byte of the pack.

12
13 **53.** A processor-readable medium having stored thereon a data structure
14 representing a 5-byte DV_METADATA_CAMERA_CONSUMER_CAMERA_2
15 pack, the data structure comprising:

16 a VerticalPanningDirection field having data unpacked from a second byte
17 of the pack;
18 a VerticalPanningSpeed field having data unpacked from the second byte of
19 the pack;
20 an ImageStabilizer field having data unpacked from a third byte of the pack;
21 a HorizontalPanningDirection field having data unpacked from the third
22 byte of the pack;
23 a HorizontalPanningSpeed field having data unpacked from the third byte of
24 the pack;
25 a FocalLength field having data unpacked from a fourth byte of the pack;

1 a ZoomEnable field having data unpacked from a fifth byte of the pack; and
2 an ElectricZoom field having data unpacked from the fifth byte of the pack.

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4 **54.** A processor-readable medium having stored thereon a data structure
5 representing a 5-byte DV_METADATA_CAMERA_SHUTTER pack, the data
6 structure comprising:

7 a ShutterSpeed field having data unpacked from a fourth and fifth byte of
8 the pack;

9 an UpperLineSpeed field having data unpacked from a second byte of the
10 pack; and

11 a LowerLinerSpeed field having data unpacked from a third byte of the
12 pack.

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